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(56) Documents Cited

**GB 2192455 A**

**US 5751829 A**

**US 5680327 A**

**US 5537211 A**

**US 4931929 A**

(58) Field of Search

**UK CL (Edition R ) G1A ACDC**

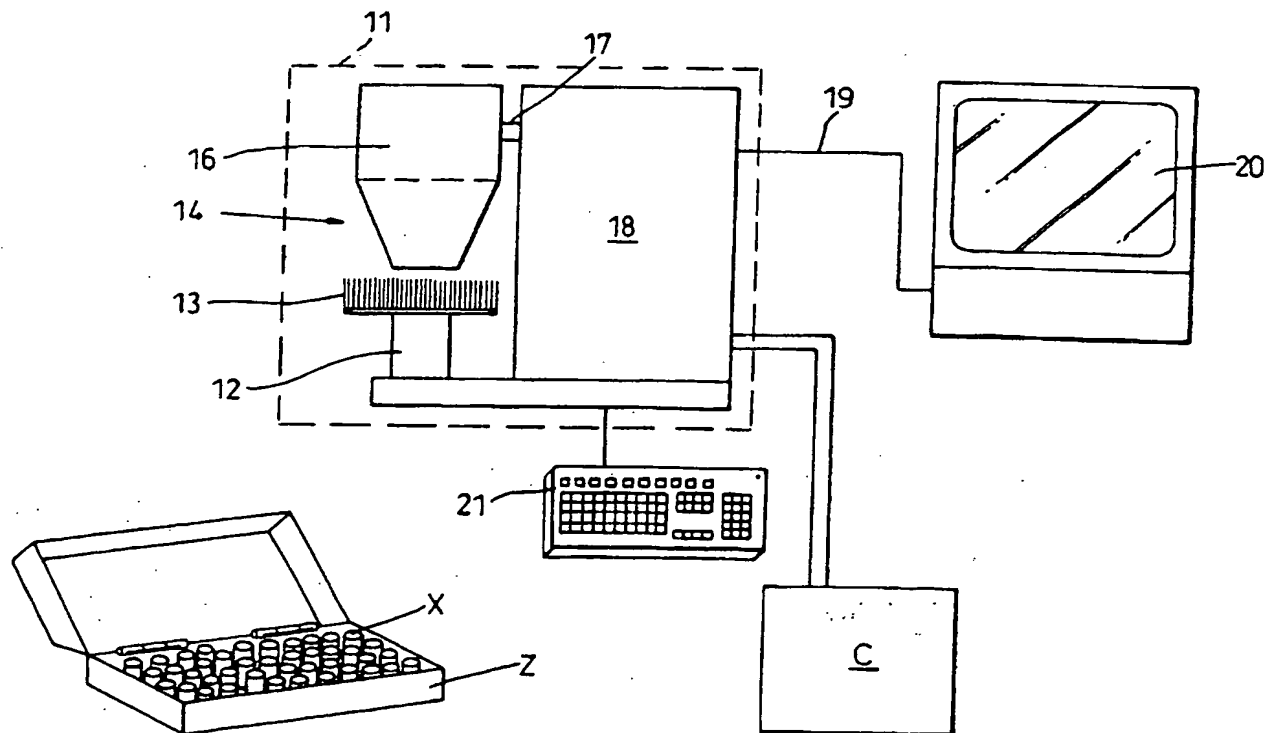
**INT CL<sup>7</sup> G01J 3/50 3/52, G06F 17/60**

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(54) Abstract Title

**Comparison of colour of articles**

(57) A system for detecting the colour of an article such as a carpet or fabric, comparing with reference data, and deriving the colour or texture required for a second matching or complementary article, includes a scanning camera 14 adjacent the article 13. The camera supplies data relating to hue, tone and/or light intensity to a processor 18 which compares the data with stored information and provides output information to enable selection of matching or complementary articles.



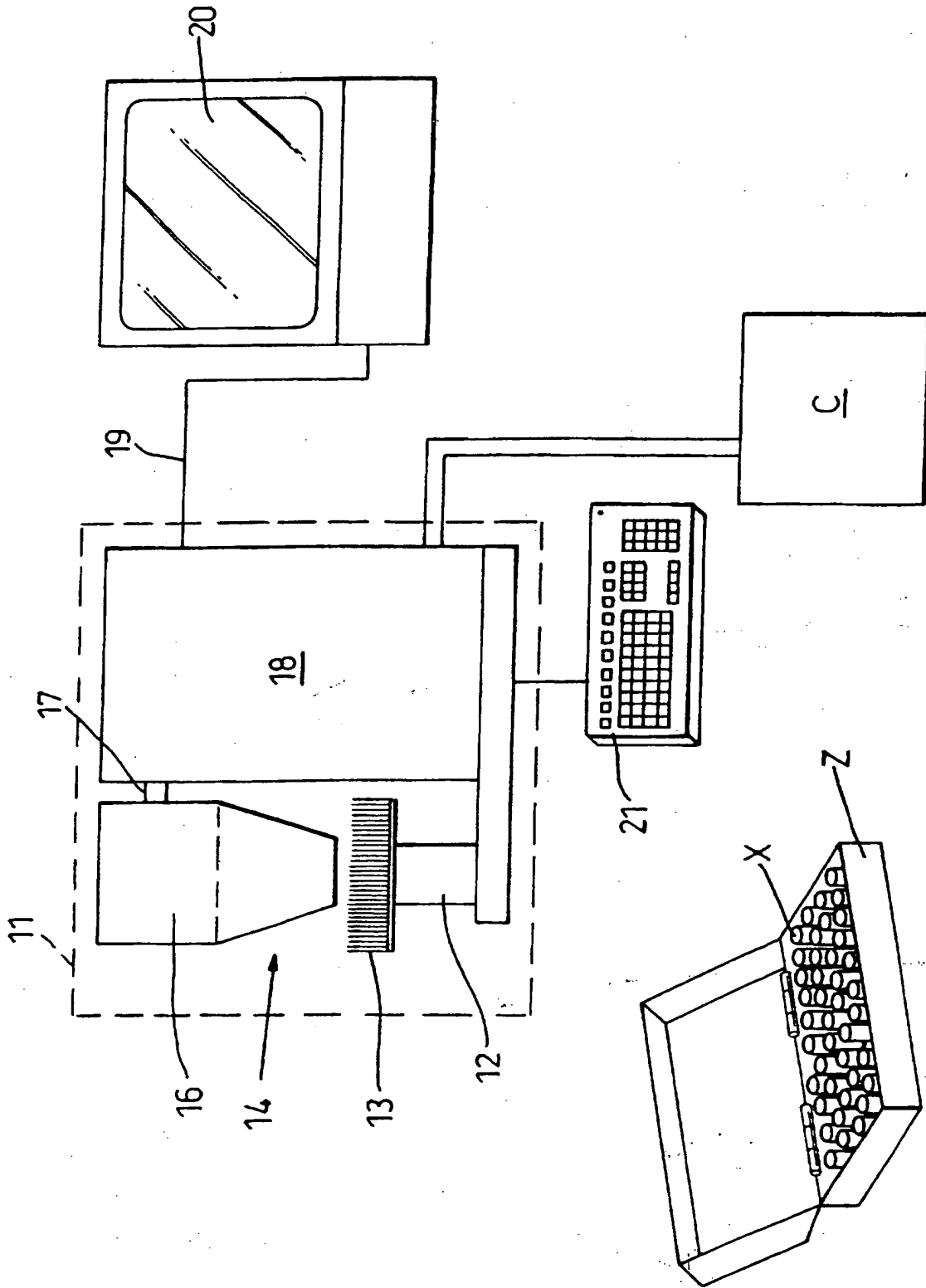
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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

claims were filed later than the filing date but within the period prescribed by Rule 25(1) of the Patents Rules 1995.

GB 2 349 206 A



## METHOD AND APPARATUS FOR COMPARISONS

This invention relates to method and apparatus for comparisons and in particular comparison of colour an article. On addition it can be used not  
5 only in respect of the colour of the article but its appearance in terms of type or form of surface texture. It is particularly concerned with comparison of an article falling in a family of articles comprising: carpet or other flooring material, wall covering of paper, fabric or other material; paint; or furnishing fabric (including curtaining). Hereafter such a family  
10 will be referred to as a being 'of the type described'.

In my co-pending application 9901960.6 there is described method and apparatus involving comparison of colour scales. According to a first aspect of that invention there is provided a method of generating colour  
15 based information originating from a sample comprising the steps of: putting the sample into a condition where it can be scanned to provide consistent colour and light information in the form of parameters (such as information relating to hue, tone and light intensity); scanning the sample to establish first value/s of the required parameter/s according to a given  
20 first range of such parameters; generating from the first value/s second value/s of the parameter/s lying in a second range of such parameters either on the basis of a one-to-one relationship between at least a part of the first range and the second range or on the basis of some other relationship or relationships between the first and second range;  
25 displaying some or all of the first value/s or the second value/s or of functions of the first or second values or combinations of the first and second values or of functions thereof either directly or in the form of a virtual or other image.

30 For the present invention there has been developed a method and apparatus for comparing colour and other appearance information. It is

particularly concerned with the provision of a user friendly system which can be used in a retail environment.

- According to a first aspect of the present invention there is provided a
- 5 method of providing information relating to the appearance of a first coloured article falling in the family of the type described to enable a second coloured article from the family to be selected or identified which can be related in a predetermined way to the first comprising the steps of:
- 1 scanning the first article to establish colour and light information and
  - 10 thereafter to provide an output in the form of derived information giving at least one of the parameters defining hue, tone and light intensity;
  - 2 relating the derived information to established parameter or parameters located in one or more ranges of such parameters to identify the
  - 15 required parameter or parameters of the second article is either by direct correspondence or by way of a predetermined range of such parameters such as provided by a colour circle or a range of colours in the visible light spectrum; the relationship between the colour/light information of the second article relative to the first being one being
  - 20 either identity, partial identity or a relationship such as being complementary or contrasting colour. Typically the step of relating the derived information to established parameter or parameters can either be by way of comparison with information stored as data or with information in the form of physical samples such as colour samples of
  - 25 fibrous material such as Chromatone (RTM).

According to a first preferred version of the first aspect of the present invention there is provided the in the scanning stage the step of

30 establishing parameters for other aspects of the appearance of the first coloured article such as type and form of surface texture, whether the appearance lies somewhere on a scale extending between mat or glossy,

between metallic or dull, between coarse or fine weave or some other visually significant attribute.

According to a second aspect of the present invention there is provided  
5 apparatus for undertaking the method of the first step comprising:

- a locating means adapted to locate the first article;
- a scanner mounted relative to the locating means and adapted to scan a first article and to provide the derived output information;
- a processing means adapted to receive the derived information and  
10 to relate the established parameter or parameters to one or more ranges of such parameters either by direct comparison with a physical sample or with entries in a range of such parameters held as a data base to identify the required parameter or parameters of the second article as aforesaid.

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According to a first preferred version of the second aspect of the present invention the processing means involves the Chromatone (RTM) colour scale whether in terms of physical samples from a range of such or in the form of a data base.

20

An exemplary embodiment of the invention will now be described with reference to the accompanying drawing of a colour comparison apparatus in the form of a block diagram.

- 25 Comparison apparatus 11 comprises a working head 12 adapted to locate an article 13, in this case a piece of carpet. The article 13 is being scanned in order to identify further coloured articles with which it is to be used namely a curtain fabric of comparable colour; a wall paint of complementary cover and a decorative wall paper border in a contrasting  
30 colour.

Scanner 14 is mounted above the working head 12 and incorporates a spectrophotometer 16 which scans the light reflective values of the sample 12 as a sequence of parameters identifying hue, tone and light intensity, which provides to input channel 17 to processor 18 quantitative  
5 information in the form of parameter values for hue, tone and light intensity of the scanned article 13. In an alternative embodiment the scanner can include a digital scanning device such as a digital camera or a flat bed scanner (rather than a spectrophotometer) which is adapted to provide a digital signal sequence representative of the hue, tone and light  
10 intensity of the sample and including lighting means to illuminate the sample so as to ensure the provision of reproducible results.

Processor 18 receives information from the input channel 17 and processes it to obtain further information appropriate to the requirements for the  
15 second article or articles. The processor 18 is programmed to automatically process output the further information on output channel 19 to a conventional video display unit 20. The processor 18 can be also be interrogated and caused to process data in a required manner by an inputting device such as keyboard 21.

20 The processor 18 is equipped with data tables and application software. One data table serves to include parameters of the colour system known as Chromatone (RTM) and to provide from the information derived from the receptor 16 the parameters of the corresponding colour. A further data  
25 table relates to a colour circle which provides a ring of parameters relating particularly to hue. Given a location on the colour circle of the original given hue as sensed by the receptor 16 the colour diametrically opposite the original colour is defined as the complementary colour. In addition given the original colour two colours located on the colour circle  
30 equidistant from the original colour and from one another provide two colours complementary to the original colour. Other relationships can be

established as required in order to relate an original colour to one or more other colours. The colour or colours derived by this process can be displayed on VDU 20 which is operated so as to ensure accurate reproduction of colours.

5

The scanner 14 provides for operation in two different ways. Firstly to relate the parameters of what is scanned to parameters already stored in one or more databases contained in, or otherwise accessible by, the processor 18. Alternatively the scanner can be used to scan in turn a proffered sample of unknown parameters followed by a scan of a standard sample, for example sample X selected from Chromatone (RTM) sample set Z to establish parameter values for the proffered sample

The processor 18 is linked to a computer C a file server which is also used to run applications relating to the retailing side of a business making use of the present invention. In this way output from the processor 18 can be used to establish information as to the location, availability, amount and cost of a selected second product. If necessary the computer C can be used to undertake processing of an order for the selected second product and to deal with associated matters such as re-ordering replacement stock for goods shipped out. In addition the computer C can be further used to analyse, for example, the use to which processor 18 is put so that ordering patterns can be established and the relative popularity of a given product or range of products can be identified and where necessary acted on.

25

Further data bases are provided in processor 18 to enable information derived from the scanning process can be stored and processed. Thus further colour scales can be incorporated to enable the colour of the original sample 13 or derivatives of it to be identified in terms of appropriate colour scales for a products.

30

In this case the carpet sample 13 is evaluated in terms of the established Chromatone (RTM) scale. This can be converted into other established scales such as Dulux (RTM) for paint or Pantone (RTM) for paper or derived scales. Further databases can be used to establish, for example, stockists, stock locations and amounts of stock of the required material. The exemplary embodiment has specified selection by colour relationships between articles. However the invention enables other visually significant factors to be taken into account given that one or more parameters can be identified to serve to define it in quantitative terms. Thus materials can be grouped by some feature of surface appearance apart from or in addition to colour. Thus a selection can be made depending on a carpet pile type, finish varying between mat and glossy, between metallic and dull, fine and coarse weave, finish simulating ranges of wood, cork or other materials and so on.

The VDU can also be used to display samples of the selected material shown in a virtual environment to enable a viewer to see the likely effect of the juxtaposition of two or more selected materials. Such virtual displays can include the effect of varying lighting conditions for example: daylight and artificial light; daylight at different times of the day.

A feature of the invention is the provision of a colour comparing and matching system which can be readily used to advantage in a retail environment to readily provide a useful and readily understood service and demonstration to a customer enabling them to obtain on presenting either from a description, or a sample, of a item from the family as aforesaid information. The system readily provides for additional features, if desired, say the submission of an order, for a product or products and information relating to the product. The invention further enables the required product or products to be demonstrated in a virtual typical environment under controlled conditions. In each case the system is



readily operated by staff without a need for a lengthy training period.

Information derived from operation of the system also serves to provide for useful management and product information enabling, for example, changes in customer preferences to be identified to enable, for example,

- 5 increased production or stocking to be achieved promptly for goods of increasing popularity. Typically where mismatching occurs, that is to say a sample provided by a customer cannot be related to an existing product, the frequency of mismatching can be established so that where the frequency in relation to a particular colour of product exceeds a threshold
- 10 value it may be deemed necessary to manufacture or otherwise create a supply of the previously unavailable product.

- The proposed method and apparatus can also be used to provide for input to the internet or to local network systems for displaying colour and finish
- 15 information such as in a virtual display system of a furnished interior.

## CLAIMS

- 1 A method of providing information relating to the appearance of a first coloured article falling in the family of the type described to enable a second coloured article from the family to be selected or identified which can be related in a predetermined way to the first characterised by the steps of:
  - scanning the first article to establish colour and light information and thereafter to provide an output in the form of derived information giving at least one of the parameters defining hue, tone and light intensity;
  - relating the derived information to established parameter or parameters located in one or more ranges of such parameters to identify the required parameter or parameters of the second article is either by direct correspondence or by way of a predetermined range of such parameters such as provided by a colour circle or a range of colours in the visible light spectrum; the relationship between the colour/light information of the second article relative to the first being one being either identity, partial identity or a relationship such as by being a complementary or a contrasting colour.
- 2 A method as claimed in Claim 1 characterised by the further step of relating the derived information to established parameter or parameters either be by way of comparison with information stored as data or with information in the form of physical samples such as colour samples of fibrous material such as Chromatone (RTM).
- 3 A method as claimed in Claim 1 or Claim 2 wherein in the scanning stage is characterised by the step of establishing parameters for other aspects of the appearance of the first coloured article such as type and form of surface texture, whether the appearance lies somewhere

on a scale extending between mat or glossy, between metallic or dull, between coarse or fine weave or between limiting values of some other visually significant attribute or attributes.

- 4 Apparatus for undertaking the method as claimed in any preceding claim of the first step characterised by:
  - a locating means adapted to locate the first article;
  - a scanner mounted relative to the locating means and adapted to scan a first article and to provide the derived output information;
  - a processing means adapted to receive the derived information and to relate the established parameter or parameters to one or more ranges of such parameters either by direct comparison with a physical sample or with entries in a range of such parameters held as a data base to identify the required parameter or parameters of the second article as aforesaid.
- 5 Apparatus as claimed in Claim 4 characterised in that the processing means involves the Chromatone (RTM) colour scale whether in terms of physical samples from a range of such or in the form of a data base.



Application No: GB 9909290.0  
Claims searched: 1-5

10 Examiner: David Brunt  
Date of search: 27 July 2000

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.R): G1A (ACDC)

Int CI (Ed.7): G01J (3/50, 3/52), G06F (17/60)

Other: Online: EPODOC, JAPIO, WPI

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2192455 A (JONES-BLAIR) see page 2 lines 74-124	1,2,4,5
X	US 5751829 (RINGLAND) see column 14 lines 23-52	1-5
X	US 5680327 (COOK) see whole document	1,4,5
A	US 5537211 (DIAL) see whole document	-
X	US 4931929 (SHERMAN) see column 8 lines 58-66	1,2,4,5

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.